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TRACKING DEVICE FOR VIDEO CAMERA

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Claims

1. A video camera tracking device, characterized by having a video camera with a zoom lens that is supported on a rotating head, a display which copies its image, an address designating means for the purpose of setting a desired area within the screen of the display, a central processing unit (CPU) which computes the direction of the video camera and the field angle from the position and dimensions that have been set on the screen, and a servo mechanism which changes the video direction of the video camera and the field angle of the zoom lens based on the information from this central processing unit.

2. The video camera tracking device of Claim 1, characterized in that the video camera is a video camera used for observation or for image processing.

Detailed explanation of the invention

Technological field of the invention

This invention concerns a video camera tracking device.

This invention is specifically related to a video camera tracking device that is used for observation or image processing (picture processing).

Prior art

In the past, as shown in Figure 9, a video camera (1) was connected to a television monitor, namely, display (7), the

camera was mounted on rotating head (5), which moved by means of manual type remote control switch (11), determining the direction of camera (1), the zoom lens (3) of the camera was moved by manual type remote control switch (13), determining the field angle, these switches were operated while the operator observed the screen, and the object was reached by repeatedly operating the on/off switch until the necessary field angle was obtained. However, this was a fairly troublesome operation, and its improvement was strongly desired.

Purpose of the invention

The purpose of this invention is to offer a video camera tracking device which is not troublesome as in the past, and which simply and positively obtains the necessary direction and field angle.

More specifically, the purpose of this invention is to offer a video camera tracking device wherein the image of the video camera is copied to a monitor, and while the image is observed, the direction and field angle size for the necessary area (scene) is designated on the display with an address designating means such as a light pen or mouse, and a motor driven rotating head is automatically moved by means of a CPU (central processing unit) toward that position. The zoom operation for a motor driven zoom lens is done in the same manner, and the zoom is set to the prescribed position with the information obtained from the CPU. In the event of removing this condition, a reset designation can

be applied, and by this means, the zoom lens again returns to wide angle (adjustable), and the rotating head can also be operated so that it returns to the initial set position.

Constitution of the invention

This invention concerns to a video camera tracking device, and is characterized by having a video camera with a zoom lens that is supported on a rotating head, a display which copies its image (in other words, a television monitor), an address designating means such as a light pen or mouse for the purpose of setting a desired area within the screen of the display, a central processing unit (CPU) which computes the direction of the video camera and the field angle (in other words, the zoom focal distance) from the position and dimensions that have been set on the screen with the address designating means such as a light pen or mouse, and a servo mechanism which moves the video direction of the video camera and the field angle of the zoom lens based on the information from the CPU.

Description of a preferred embodiment

Next, a preferred embodiment of this invention is explained in detail with reference to the appended figures.

Figure 1 is a simplified drawing of a preferred embodiment of the device of this invention. Video camera (1) having zoom lens (3) is mounted on rotating head (5), and the image of the camera is copied on display (7). (11) is a CPU, which, as explained below, controls the focal distance (field angle) of

zoom lens (3) and the direction of the rotation angle (camera) of rotating head (5) based on the input signal from light pen (9).

The method for using the device shown in Figure 1 is explained below with reference to Figure 2.

1. Assume that the subject to be enlarged is in one section within the image of the camera which has been set to the normal position and field angle (mainly wide angle) (Figure 2 (1), Figure 3).

2. The necessary area (17) is designated on display (7) by means of light pen (9). Then, operation designation ("go") is supplied (Figure 4).

3. Due to this command, the image signal during wide angle, and the period and direction that have been designated, are calculated in CPU (11), and based on those calculation results, rotating head (5) and zoom lens (3) automatically track and reach the target (Figure 2 (2), (3), Figure 4).

The circuit diagram of the device of Figure 1 is shown in Figure 5. First, at the outset, the image signal that is obtained at video camera (1) is sent to CPU (11).

In normal cases, the focus of the camera is set to the wide angle side by means of auto focus for manual adjustment operation. Since the auto focus itself is already know, its explanation is omitted. The necessary direction and field angle of camera (1) for a certain specific subject is designated by light pen (9) from the wide angle image on display (7). The operation of light pen (9) is a method wherein a light-emitting scan position at the CRT screen is read out, and is already known; therefore, its explanation is omitted. The signal for the direction and field angle of camera (1) that has been obtained

from the screen by means of light pen (9) is processed by the method shown in Figure 6 and calculated at CPU (11).

As shown in Figure 6, from the necessary area (range) (23, 23,31,31) within H cycle and V cycle of light pen (9), the direction of the camera (1) is calculated at CPU (11) so as to face the center, and the drive for the zoom lens for the purpose of matching the focal distance is also calculated in CPU (11). This data is D/A converted so as to drive the respective servo systems shown in Figure 5, which work in conjunction with the motors; the feedback from each position is made so as to be able to determine the accurate control positions.

(51) is the up/down potentiometer, (53) is the up/down drive mechanism system servo, (61) is the left/right potentiometer, and (63) is the left/right drive mechanism system servo. (77) is the zoom potentiometer, (73) is the zoom drive mechanism system servo, (55,65,75) are the A/D converters, (57,67,71) are the motors, and (79) is a RAM.

Reading from the H cycle and V cycle is explained. The scan position pulses (23,23,31,31) are read from the blanking for the H and V video signals (HB,VB) and are calculated as the information shown in Figure 7 and Figure 8.

The a/2 and b/2 positions obtained from the H cycle light pen become the H and V positions, and the (a) width and (b) width correspond to the field angle, in other words, the focal distance of zoom lens (3).

Since δ and d in Figure 7 and Figure 8 can be ignored if the pulse width is narrow, terms 1 and 2 can be taken as the positions of H and V,

$$\frac{(\delta + a)}{2} \quad \frac{(d + b)}{2}$$

In the same manner, the field angle can also be calculated as the width of (δ + a) and (d + b). Also, with regard to the information for the field angle setup, in practice, since the focal distance can be determined from either signals (δ + a) or (d + b) of H and V, it is permissible if just one of the signals is used during calculations.

In Figure 5, the RAM (79) is the RAM for operation software dedicated to this servo system during the calculations of CPU (11), and handles the rewriting of the information from light pen (9) and the determination of the necessary field angle and camera direction.

As is clear from the above explanation, in the past, the switch operation was done while separately repeating the operations of the rotating head and lens field angle setup, but according to this invention, the necessary position (direction of the camera) and field angle (focal distance of the zoom camera) can be set at one time by means of a light pen while the display is observed, making it possible to improve the observation capabilities and to increase processing speed.

Brief explanation of the figures

Figure 1 is a simplified drawing of one embodiment of a video camera tracking device of this invention.

Figure 2 is an explanatory diagram which shows the operation of the device of this invention.

Figure 3 is an explanatory diagram which shows the condition when the zoom lens of the device of this invention is set to wide angle.

Figure 4 is an explanatory diagram which shows the necessary area designation method by means of a light pen on the display of the device of this invention.

Figure 5 is a simplified circuit diagram of the device of this invention.

Figure 6 is an explanatory diagram of the video signal that is used in the device of this invention.

Figure 7 and Figure 8 are explanatory diagrams of the H cycle and the V cycle of the video signal, respectively,

Figure 9 is an explanatory diagram of a video camera tracking device used until now.

1. Video camera
3. Zoom lens
5. Rotating head
7. Display
9. Light pen
11. CPU
13. Subject to be enlarged
15. Subject within the screen to be enlarged.
17. Frame of area to be enlarged drawn by the light and
21. H cycle of video signal
23,31. Signal obtained from light pen
27,33. Video signal

41. Remote control switch used for rotating head
43. Remote control switch used for zoom lens
51. Up/down potentiometer
53. Up/down drive mechanism system servo
55,65,75. A/D converter
57,67. Motor
71. Zoom motor
59,69,80. Potentiometer signal amplifier
61. Left/right potentiometer
63. Left/right drive mechanism system servo
73. Zoom drive mechanism system servo
77. Zoom potentiometer
79. RAM

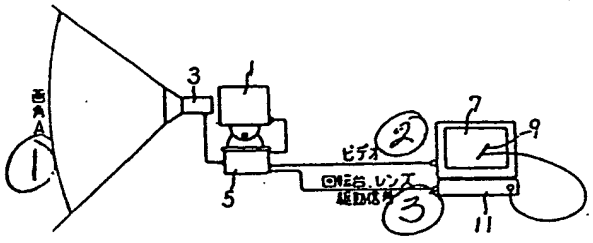

Figure 1

Key: 1 Field angle A
2 Video
3 Drive circuits for rotating head, zoom lens

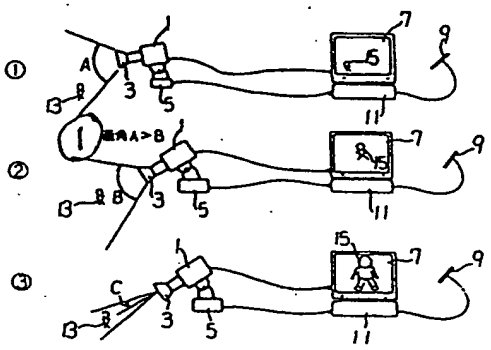

Figure 2

Key: 1 Field angle A > B

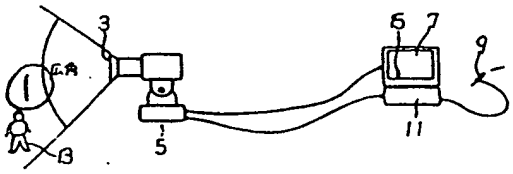

Figure 3

Key: 1 Wide angle

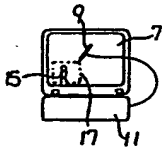

Figure 4

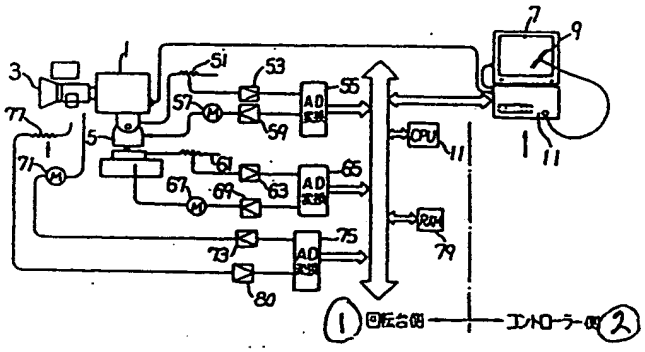

Figure 5

Key: 1 Rotating head side
2 Controller side

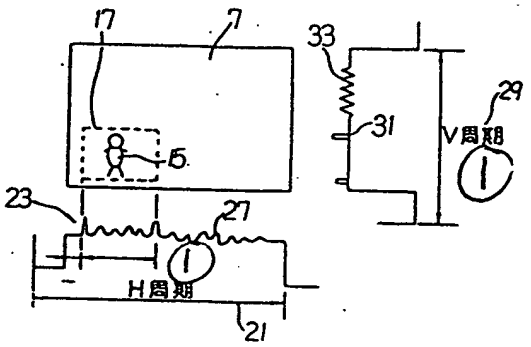

Figure 6

Key: 1 Cycle

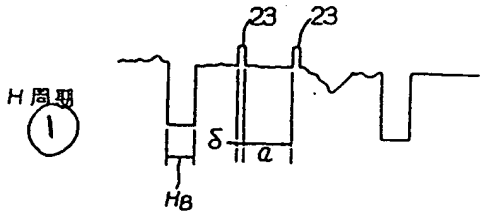

Figure 7

Key: 1 Cycle

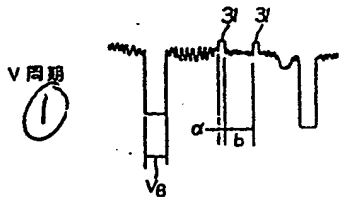

Figure 8

Key: 1 Cycle

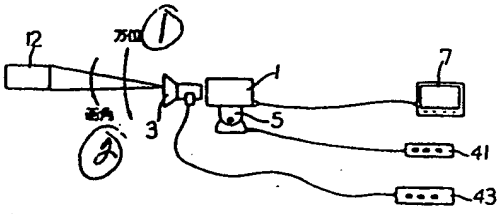

Figure 9

Key: 1 Direction
2 Field angle